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REMARKS

In section 2 of the Office Action, the Examiner objects to claims 1-3 and 7-24, asserting that claims 1 and 17 set forth both apparatus and process language, thus overlapping two different classes of invention. The terms "forming" and "formed" in the apparatus claims have been amended to "having", "disposed", etc. The Applicants believe that this objection has been overcome.

In section 4, the Examiner rejects claims 1-3, 7-15 and 17-24 under 35 USC 103(a) as being unpatentable over the acknowledged prior art (APA) in view of Tsukagoshi et al. (US Patent No. 5,804,882). Moreover, in section 5, claim 16 is rejected under 35 USC 103(a) as being unpatentable over APA in view of Tsukagoshi et al., and further in view of Loh et al. (US Patent No. 5,650,919). These rejections are respectfully traversed.

APA, Tsukagoshi et al. and Loh et al., standing alone or in combination, fail to disclose, teach, or suggest, *inter alia*, the following features recited by claim 1 of the present application:

"wherein the barrier structure comprises a plurality of first barrier ribs extending along a first direction to form a partition between the bumps corresponding to the first pads, a plurality of second barrier ribs extending along the first direction to form a partition between the bumps corresponding to the second pads and a plurality of third barrier ribs extending along a second direction to form a partition between the bumps

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corresponding to the first and the second pads”.

The Examiner basically asserts that APA teaches all elements of claim 1 except for the third barrier ribs, and that Tsukagoshi et al. teaches a plurality of third barrier ribs 6 extending along a second direction to form interior partitions between bumps 7 corresponding to the first pads 5 and second pads 5. The Applicants respectfully disagree.

First, the spacer elements 6 in Tsukagoshi et al. **cannot serve as barriers** to separate the conductive particles as disclosed in the present application. For example, Tsukagoshi et al. teaches that the height of the spacer 6 is almost the same as the projecting electrodes 7 (see, e.g., abstract and col. 6, lines 35-37). The spacer 6 cannot work as the barrier structure which must be higher than the bump or electrode. See, for example, Fig. 1G of the present application where the barriers 6 (peak-shape dielectric dams) are able to block the movement of the particles 1. In Figs. 1-4 and 9 of Tsukagoshi et al., however, even if the spacers 6 are present, the **electroconductive particles 12 can still move freely from one area to another** (note the particles - the round articles on top of the spacers 6 or below the spacers 6 in these figures). Thus, the spacers 6 are not “a barrier structure ... **separating the conductive particles**” and “form a partition between the bumps corresponding to the first and the second pads” as recited by claim 1 of the present application. Also, Tsukagoshi et al. states that the spacers can be conductive (see col. 6, line 25). This is further evidence that the spacers are not the barriers as defined by claim 1.

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If the Examiner considers this argument persuasive, but does not think the language of claim 1 is clear enough on the barrier structure, please contact the undersigned by phone to possibly amend the claim language in order to put this application into condition for allowance.

Second, the spacers 6 in Tsukagoshi et al. are designed to guide the flow of the adhesive smoothly (see col. 5, lines 22-30) and remove the bubble from the center to peripheral. It does not have the function of separating conductive particles. In APA or Loh et al. (the same reference), however, the objective is to prevent short circuiting or the undesired moving of the conductive particles. Thus, there is **no motivation** to incorporate the spacer of Tsukagoshi et al. into APA or Loh et al., because it **would not help achieving the objective** of these references, because (i) the height of the spacer is almost the same as the projecting electrodes, thus cannot preventing conductive particles from moving among different pads; and (ii) Tsukagoshi et al. states that the material of the spacer can be **conductive**, obviously not designed for preventing conductive particles.

At page 4, paragraph 1 of the Office Action, the Examiner states that the motivation for modifying APA to incorporate the spacers of Tsukagoshi et al. is for "providing a smooth, uniform flow of adhesive from the center to the edge portions of the semiconductor chip during the bonding procedure". It seems that APA or Loh et al. nowhere mentions a bonding procedure or providing a smooth, uniform flow of adhesive. Moreover, if the purpose is to provide a smooth, uniform flow of adhesive **from the center**

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to the edge portions of the semiconductor chip, it seems that the peak-shaped dielectric dams are already sufficient. There is no need to form a plurality of third barrier ribs between the bumps. Even if the spacers 6 of Tsukagoshi et al. are incorporated into the structure of APA, since the spacers are almost the same height as surrounding projecting electrodes, they cannot achieve the desired objective of the claimed invention (preventing conductive particles from moving between the first and second pads).

Under MPEP 2142, to reach a proper determination under 35 USC 103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences". Impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

In the instant case, the Applicants believe that the Examiner's combining of Tsukagoshi et al. and APA is an **"impermissible hindsight"**, which is reached only because he has read the Applicants' disclosure first. Otherwise, incorporating of the spacers into APA's structure seems to be **redundant and unnecessary**. Even if combined, the cited references do not teach or suggest the claimed limitation that the third barrier ribs form a partition between the bumps corresponding to the first and the second pads.

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In addition to the barrier structure, the Applicants believe that Tsukagoshi et al. does not disclose forming partitions between the **bumps** corresponding to the first pads and the second pads, as recited by claim 1 of the present application. In the Office Action, the Examiner identifies the projecting electrodes 7 as the bumps and the circuit 5 as the first pads and the second pads. The Applicants respectfully disagree. Claim 1 of the present application clearly recites that the bumps are formed on top of the electrodes. Thus, a bump is a different structure from the electrodes.

Moreover, if the circuit 5 is identified as the first pads and the second pads, it is impossible to form a relationship between the pads and the barrier ribs as recited by the last paragraph of claim 1. The Examiner relies on Fig. 5A of Tsukagoshi and asserts that this figure shows the spacers 6 form a partition between the first pads (the top side of circuits 5) and the second pads (the bottom side of circuits 5). If this is the case, then where is the bump corresponding to the first pad, where is the bump corresponding to the second pad? And where are the **partitions** formed between the bumps corresponding to the first pads and the **partitions** formed between the bumps corresponding to the second pads, as recited by claim 1 of the present application?

Due to the reasons stated above, the Applicants believe that claim 1 is patentable over the cited references. Claims 2-3, 7-16 and 23-24 are also patentable, at least by virtue of their dependency from claim 1.

Similarly, claim 17 recites, in part, "a barrier rib disposed on the base

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surface, separating the conductive particles wherein the barrier rib comprises a plurality of first barrier ribs extending along a first direction to separate the conductive particles between the first pads, a plurality of second barrier ribs extending along the first direction to separate the conductive particles between the second pads and a plurality of third barrier ribs extending along a second direction, separating the conductive particles between the first and the second pads". Claim 22 recites, in part, "forming plural bumps on the protective layer in accordance with the electrodes, and conducting the electrodes and the bumps; and forming a plurality of first, second and third barrier ribs on the side of the circuit device, thereby separating the bumps". Claims 17 and 22 are also patentable because the cited references do not disclose or suggest all these limitations. Claims 18-21 are patentable, at least by virtue of their dependency from claim 17.

The Applicants have attempted to address all of the issues raised by the Examiner in the Office Action as the Applicants understand them. The Applicants believe that the application is now in condition for allowance. If any point requires further explanation, the Examiner is invited to telephone Troy Cai at (323) 934-2300 or e-mail Troy Cai at tcai@ladasparry.com.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account No. 12-0415. In particular, if this response is not timely filed, then the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136 (a) requesting an extension of time of the number of months necessary to make this response timely filed and the

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March 30, 2004

(Date of Deposit)

Troy Guangyu Cai

(Name of Applicant, Assignee or Registered Representative)

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Respectfully submitted,


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